

Descriptions of Leak Detection Methods

INVENTORY CONTROL

This is also known as the familiar "stick" reading method of leak detection. It must be done correctly or it will not detect leaks. If inventory control is used as a leak detection method, you must also conduct tank tightness testing every five years. You may not qualify to use this method of release detection. To find out if you qualify to use this method answer the questions below:

- **Have your tanks been installed for more than 10 years?**

Generally if your tanks are more than 10 years old you **may not** use Inventory Control and Tank Tightness Testing. There is an exception to this rule. If your tanks were upgraded to meet the December 22, 1998 deadline, you **may** use inventory control and tank tightness testing every five years for ten years after the upgrade, **if, and only if**, you used an internal inspection to assess the tanks prior to upgrade. Many tank owners in Tennessee did not use an internal inspection to conduct tank assessment. If you assessed tanks using any method other than an internal inspection and upgraded your tanks, you must now be using a form of monthly monitoring.

- **Have your tanks been installed for less than 10 years?**

If your tanks have been installed for less than ten years you **may** use inventory control and tank tightness testing every five years for ten years. After that, you must change to a form of monthly monitoring.

If you are able to use Inventory Control, follow the rules listed below for each tank using this method.

- You must determine if there is enough room in the tanks to receive the product to be delivered to it. You must make stick readings both before and after product delivery. You should reconcile delivery receipts.
- Your stick must be capable of reading product level to the nearest one-eighth of an inch.
- Product delivery must be made through a drop tube, which extends to within one foot of the tank bottom.
- Conduct stick readings for water levels at least once each month.
- Your dispenser must be calibrated annually to the Tennessee Department of Agriculture standards for accuracy.
- You must make stick readings every day the system is in operation. "In operation" means any day that product is transferred into or out of the tank.
- Record all deliveries, withdrawals and amounts remaining.
- To determine if this tank passes a leak check, reconcile all daily readings each month. For the month, you must be **less than** 1% of your monthly flow-through plus 130 gallons.
- If your calculations show **more than** 1% plus 130 gallons, carefully watch your inventory for the next month. If situation does not correct itself in second consecutive month, you must report this condition as a suspected release.

If you want to know more about Inventory Control, EPA has a publication called **Doing Inventory Control Right**, which is located in Folder 7 on this CD.

MANUAL TANK GAUGING

If a tank is 1000 gallons or less, and it can be left out of use for a specified period of time each week, this method can be used as a sole method of release detection.

It may also be used on tanks between 1001 and 2000 gallons provided it is combined with annual tank tightness testing.

See table below for tank sizes, diameters, time intervals which must be followed when using this method.

Method:

- Take two stick readings at the beginning of the test.
- Average these readings to establish a **Beginning Level**.
- Wait correct amount of time before repeating this procedure.
- Repeat sticking procedure and obtain two more readings.
- Average these to determine the **Ending Level**.
- Subtract the **Ending Level** from the **Beginning Level** and compare to the Weekly Standard below.
- The result must be within the Weekly Standard to be considered tight.
- Repeat this procedure each week.
- Add all the weekly test results for one month and divide by the number of weeks in the month.
- Compare this result to the Monthly Standard.

This result must be within the Monthly Standard to be considered tight.

Nominal Tank Capacity (in gallons)	Tank Dimensions	Weekly Standard (in gallons)	Monthly Standard (in gallons)	Minimum Test Duration
500	N/A	10	5	36 hours
551 - 1,000	N/A	13	7	36 hours
1,000	64" diameter x 73" length	9	4	44 hours
1,000	48" diameter x 128" length	12	6	58 hours
1,1001 - 2,000	N/A	26	13	36 hours

If you want to know more about Manual Tank Gauging, EPA has a publication called **Manual Tank Gauging for Small Underground Storage Tanks**, which is located in Folder 7 on this CD.

AUTOMATIC TANK GAUGING (ATG)

Probes in the tank are connected to a console containing electronics that monitor product levels. Precise product level readings are made in frequent intervals and a computer processes information and determines if preset conditions have been exceeded.

If preset conditions are exceeded, an alarm is triggered to alert tank owner/operator to possibility of a leak.

Many ATGs can be programmed to operate in monthly monitoring or tank tightness test modes. There are different performance standards for each method of operation. An ATG device in monthly monitoring mode must be able to detect a 0.2 gallon per hour leak from any part of the system which routinely contains product.

An ATG must be put into "leak check mode" once each month. When a tank is in "leak check mode" there must be no product put into or removed from the tank. Results of this test must indicate a "pass" or you may have an ongoing release.

Some ATGs are capable of doing "continuous" leak detection, meaning the operator does not have to put the system into leak check mode once per month. The software contained in this kind of program automatically makes the calculations based on there being enough "quiet time" where the tank is idle. Stations that operate 24 hours a day may find it difficult to collect enough quiet time. If that is the case, the tank owner must shut the tank down long enough for the system to collect the necessary data to determine if the tank is tight.

If you want to know more about Automatic Tank Gauging, EPA has a publication called **Getting The Most Out Of Your Automatic Tank Gauging System** which is located in Folder 7 on this CD.

GROUNDWATER MONITORING

This method is allowable only under certain restrictive conditions. Make sure that your site meets all of these conditions or you could face enforcement actions for failure to conduct leak detection properly.

- Groundwater monitoring may not be used where the tank excavation has encountered bedrock.
- Water in monitoring wells must always be within 20 feet of surface.
- Wells must be installed in or as close to the tank pit as possible.
- The tank pit backfill must be permeable.
- Wells must be installed according to certain criteria.
- Wells must be clearly marked and secured.
- The monitoring device must be able to detect at least 1/8" of free product on water surface.

Wells must be checked every 30 days and the results recorded in a monthly log.

If you want to know more about Groundwater Monitoring the Division has a compliance Guidance Document entitled CGD 105 - Groundwater Monitoring. Links to these documents can be found in Folder 6. on this CD.

VAPOR MONITORING

May be done using dry monitoring wells in tank excavation and along line trenches with either portable or fixed equipment. Equipment detects vapors through a variety of methods. Equipment is sensitive and has rapid response time but may generate false alarms due to background contamination.

Cannot be used where product is not volatile (diesel, kerosene or heavy oil), the backfill is non-porous (hard-packed earth or clay) or background is already contaminated due to spills, overfills or previous leaks.

Enough vapor wells must be installed and operated so a leak can be detected within 30 days.

Take readings every 30 days. Report results on a monitoring well log.

Monitoring wells must be clearly marked and secured.

If you want to know more about Vapor Monitoring, the Division has a compliance Guidance Document entitled CGD 106 - Vapor Monitoring. Links to this document can be found in Folder 6. on this CD.

STATISTICAL INVENTORY RECONCILIATION (SIR)

This method is similar to inventory control. It differs from inventory control in that it is considered an acceptable form of monthly monitoring for tanks and piping* and does not have to be combined with a tightness test every five years.

Stick tank every day that it is in operation. Balance sales and deliveries for over and short.

Send records to SIR analyst who performs special statistical analysis with a computer.

Can be used to replace annual tank and line tightness testing.

If statistical analysis performed by SIR vendor is inconclusive for two (2) consecutive methods, report to State Division of UST a possible release and perform a tank tightness test.

*Use of SIR alone is not sufficient for Pressurized Piping. This requires a form of catastrophic leak detection such as Automatic Line Leak Detectors in addition to SIR.

If you want to know more about Statistical Inventory Reconciliation, the Division has a compliance Guidance Document entitled CGD 107 - SIR. Links to this document can be found in Folder 6. on this CD.

INTERSTITIAL MONITORING

This is a method of leak detection in which secondary containment is used and leak detection can be either between the walls of a double-walled tank or between the tank wall and secondary barrier or line in the tank pit excavation.

If a tank pit liner is used, it must not allow product to pass through and be constructed so that it directs any leaked product to a monitoring point.

Barriers must always be above groundwater and must not interfere with operation of the cathodic protection system if there is one in use.

If secondary containment is created by a double wall tank, a variety of release detection devices can be used for monitoring this annular area.

If you want to know more about Interstitial Monitoring, the Division has a compliance Guidance Document entitled CGD 108 - Interstitial Monitoring. Links to this document can be found in Folder 6. on this CD.

TANK TIGHTNESS TESTING

Tests system for leaks by closely monitoring changes in product level over a short period of time.

This test must be able to detect a leak of at least 0.1 gallon per hour from tank while accounting for testing variables like product expansion or contraction, vapor products, tank deformation, water table level, etc.

Tennessee does not currently license, certify, or approve any particular testing methodology or tester, but only recognizes test methodology listed on the list published by the National Work Group on Leak Detection Evaluations. You can read or download this list at their website: <http://www.nwglde.org/>

If you want to know more about tank tightness testing, the Division has a compliance Guidance Document entitled CGD 112 - Tank and Line Tightness Testing. Links to this document can be found in Folder 6. on this CD.

LEAK DETECTION FOR PIPING

There are two kinds of product delivery piping: pressurized and suction. Suction piping operates at less than atmospheric pressure and is less likely to result in large releases than pressurized piping. Pressurized piping uses a pump submerged in the product and maintains a positive pressure on the product lines even when product is not being dispensed.

There are different leak detection requirements for each type of product delivery piping.

Any monthly method of leak detection can be used for piping if it can detect a release from piping with 30 days.

An annual line tightness test may be conducted on pressurized piping systems in lieu of monthly monitoring.

Automatic line leak detectors are required for pressurized piping. These are designed to interrupt the flow of product in the event of a catastrophic release. They must be capable of detecting a release of 3 gallons per hour at 10 psi within 1 hour.

If you want to know more about piping leak detection requirements, the Division has two compliance Guidance Documents entitled CGD 110 - Pressurized Piping and CGD 111 - Suction Piping. Links to this document can be found in Folder 6. on this CD

LEAK DETECTION RECORDKEEPING

Keep all written performance claims, manufacturer's schedules of required maintenance, and systems calibration for 5 years from date of installation.

Keep results of all sampling, testing, or monitoring for 1 year. This includes tightness tests, inventory records, monthly test results, and monitoring well logs.

It is not sufficient to merely DO monthly leak detection. You must also be able to document that you have done the required monthly checks for leaks. This means keeping careful and complete records.